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ABSTRACT

Although graduate programs hope that their students will be committed to research in their careers, most students express ambivalence towards research. Identifying the variables that predict involvement in research thus seems crucial. In this study 136 doctoral students from a wide range of disciplines completed the Research Self-Efficacy Scale (RSES) along with a demographic questionnaire. The RSES was designed to measure self-efficacy beliefs regarding one's ability to successfully perform various research-related behaviors. Hierarchical regression analysis indicated that the number of years in graduate school and student involvement in research contribute significantly to the prediction of research self-efficacy. Initial data on the usefulness of the RSES also suggest that this tool may be effective in revealing why students lack strong interest in research and subsequently do little or no research after graduation. Researchers who employ the RSES should use caution in interpreting its results: assigned rankings on unanswered confidence ratings and the Scale's limited inquiry on future research may lead to incorrect assumptions on a subject's research interests. (RJM)

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Prediction of Research Self-Efficacy and Future Research Involvement

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Prediction of Research Self-Efficacy
and Future Research Involvement

ABSTRACT

Although training programs hope that their graduates will be committed to science and research in their careers, most students indicate an ambivalence toward the research process and a lack of strong research interests (Gelso, 1979; Magoon & Holland, 1984; Royalty, Gelso, Mallinckrodt, & Garrett, 1986). Identifying the variables which predict involvement in research seems crucial. Participants included 136 doctoral students who completed the Research Self-Efficacy Scale (RSES) and a demographic questionnaire. Hierarchical regressions indicated that the number of years in graduate school and involvement in research activities contribute significantly to the prediction of research self-efficacy. Three subscales of the RSES, early tasks, conceptualization, and implementation accounted for unique variance in the prediction of future research involvement.

Prediction of Research Self-Efficacy and Future Research Involvement

Professional discourse in the area of research training in professional psychology has been minimal at best. Fretz (1986) lamented the current state of scientific training practices and attributed it to, in part, the scarcity of data on research training and its impact on students. The lack of attention to scientific instruction seems paradoxical given the emphasis placed on the scientist-practitioner model of training by APA-approved professional psychology programs. Concern for this inadequacy in research training among professional psychologists seems warranted. Training programs hope that their graduates will be committed to science and research in their careers. However, most students are initially ambivalent toward the research process and continue to lack strong interest in research throughout their training (Gelso, 1979; Magoon & Holland, 1984; Royalty, Gelso, Mallinkrodt, & Garrett, 1986). Recent studies have found that the occupational interests of both counseling psychologists and graduate students in counseling psychology have tended to move away from research intensive toward practice intensive occupations (Fitzgerald & Osipow, 1986; 1988). Thus, it seems important to examine critical variables which may impede graduate students' interest in research, their participation in research-related behaviors, and their subsequent pursuit of a career which involves active research participation.

Applying Bandura's (1977) theory of self-efficacy beliefs to the research training process may reveal the variables important for developing interest in research. Self-efficacy beliefs are defined as an estimation of one's ability to successfully perform desired behaviors to produce outcomes (Bandura, 1977). It is presumed that self-efficacy beliefs have the most powerful influence on initiation and persistence of behavior (Bandura, 1977).

Several authors have linked self-efficacy theory to the research training process (Betz, 1986; Royalty & Reising, 1986; Wampold, 1986). They hypothesized that inadequate research self-efficacy beliefs are a possible causal factor of students' lack of strong interest and participation in research-related activities. Research self-efficacy may be conceptualized as the degree to which an individual believes she/he has the ability to complete various research tasks (e.g., conceptualization, analysis, writing). Theoretically, low research self-efficacy beliefs lead to behavioral avoidance; when expectations are low, individuals refrain from testing their belief systems (Betz, 1986).

Given the potential importance of research self-efficacy to the research training process, preliminary exploration in this area appears to be of heuristic and practical value. The area of research self-efficacy is in its infancy. Thus far, no studies

have examined research self-efficacy across various disciplines.

The goal of this study was to examine the research self-efficacy among doctoral students from a wide variety of disciplines. The Research Self-Efficacy Scale (RSES; Greeley, et al., 1989) was designed to measure one's estimation of her/his ability to perform various research-related behaviors. The study examines background variables that may predict the strength of one's research self-efficacy and assesses the predictive potential of the RSES for research interests. We hypothesized that gender, age, number of years in graduate school, type of doctoral program, research background (number of statistics and research design courses), and previous research involvement would influence research self-efficacy. Specifically, it was hypothesized that men on average would have stronger research self-efficacy beliefs than women because they tend to have more math and science training and experience (Bureau of Labor Statistics, 1990). It was also hypothesized that the longer one is in a doctoral program, the more exposure one would have to statistics, design courses, and research itself, thus leading to increased research involvement and higher research self-efficacy. The type of doctoral program a student is in was also hypothesized to have an effect on research self-efficacy beliefs. Specifically, those students in more science-oriented fields (as rated on the Goldman and Hewitt scale) were expected to have higher research self-efficacy beliefs. Finally, those students with more courses in statistics and design, and those with more previous involvement with research, were expected to have higher research self-efficacy beliefs.

In this analysis we also attempted to identify variables that predicted interest in doing research as a professional. In addition to background variables (e.g., gender, years in graduate school, doctoral program, research background, research involvement), it was hypothesized that the four subscales of the RSES would further explain future involvement in research.

Method

Participants

This study consisted of 136 doctoral students (69 males, 67 females) enrolled in a large mid-eastern university. The disciplines represented by this sample include social sciences, 37%; biological sciences, 41%; and physical sciences, 21%. Participants had been enrolled in their doctoral program for an average of 2.57 years.

Measures

Background Questionnaire. Participants were asked to provide the following demographic information: gender, age, graduate program, year in program, involvement in a research project, completion of a research thesis or project, and number of completed statistics and research design courses.

Participants were also asked to use a 5-point scale to rate their interest in doing research in their graduate program and as a professional.

Research Self-Efficacy Scale (Greeley et al., 1989). This 53-item instrument was designed to measure an individual's perceived ability to perform various research-related behaviors. The development of the RSES was based on Bandura's (1977) contention that self-efficacy can vary across activities and situational circumstances. The format of the RSES was guided by the format of the Counselor Self-Efficacy Scale constructed by Johnson, Baker, Kopala, Kiselica, and Thompson (1989) in their study of counseling self-efficacy.

Behaviors significant to research were presented on the RSES in chronological order as they would occur in a typical dissertation. The research process was conceived as beginning at the conceptualization and idea phase and moving through the analysis to the writing stage. Questions related to laboratory work in research were also included in order to make the RSES applicable to a variety of science-oriented disciplines.

The RSES was constructed with the following proposed factor structure: (a) Find and research an idea, 18 items; (b) Present and write the idea, 4 items; (c) Finalize the research idea and method, 5 items; (d) Conduct the research, 8 items; (e) Analyze data, 6 items; and (f) Write and present results, 10 items. The operational definition of research self-efficacy used was the perception of performance capability in relation to these six factors. Subjects were asked to place a check next to those behaviors they thought they could perform right now. They were then asked to place a number in the right-hand column indicating the degree of confidence they had in their ability to successfully perform that behavior. Strength was rated on a 100-point scale ranging from: No confidence (0) to complete confidence (100).

Procedures

A list of all Ph.D. programs offered at the university was obtained. Two raters used Goldman and Hewitt's (1976) science-nonscience continuum to rate each program (interrater reliability was 82%). Differences were resolved by a third rater. Programs representing humanities, social sciences, biological sciences, and physical sciences were identified for inclusion in the study (the students from the humanities were not used in this study but were participants in a larger study being conducted concurrently). Fine arts programs were not included because the dissertation process in that field was dissimilar to that of the other fields. Programs and students from the remaining programs were randomly selected for inclusion in the study.

A packet was sent to 450 prospective subjects. The packet contained: (a) a cover letter; (b) the RSES; (c) a background

questionnaire; and (d) a request to return the completed questionnaires. Three weeks after the initial mailing participants who had not returned their questionnaires were sent a follow-up letter encouraging their participation. One hundred seventy-seven usable questionnaires were received, resulting in a response rate of 39%. An additional 12 questionnaires were also returned; of these, one was unusable, 8 indicated overt refusal, and 3 were undeliverable.

Results

Prior to any analyses, the questionnaires were screened for missing data. On some items, a few participants wrote "NA" in the strength score column or left it blank. Zeros were assigned to the missing confidence ratings because, given the instructions to rate each item, it was assumed that the participants' ability to perform these behaviors was poor.

Correlations between the variables are displayed in Table 1. A hierarchical regression strategy was used to predict research self-efficacy and interest in research involvement as a professional. In both analyses, background variables were controlled for by entering them first in the equation. Variables most significant theoretically were then added to the regression equations. Specifically, in the regression predicting research self-efficacy the independent variables were sex, age, years in graduate school, type of doctoral program, research background and research involvement. The independent variables entered for the prediction of future research involvement as a professional were sex, age, type of doctoral program, research background, research involvement, and the four subscales of the RSES (Early Tasks, Conceptualization, Implementation, and Presenting the Results).

Results of the first hierarchical regression analysis indicated that number of years in graduate school ($p \leq .05$) and involvement in research activities ($p \leq .01$) contributed significantly to the prediction of research self-efficacy. Twelve percent ($R^2 = .124$) of the variance was accounted for (see Table 2).

Results of the hierarchical regression predicting involvement in research as a professional indicated that unique variance was accounted for by three subscales of the RSES: Early Tasks ($p \leq .01$), Conceptualization ($p \leq .01$), and Implementation ($p \leq .01$). With all nine variables entered in the equation a total of 21% ($R^2 = .206$) of the variance predicting involvement in research as a professional was accounted for (see Table 3).

Discussion

Results of the regression analyses were encouraging. Variables were identified which account for a student's research self-efficacy. It was found that the number of years a student

has been in graduate school and his/her involvement in research activities contributed significantly to the prediction of research self-efficacy. Further, three subscales of the RSES (i.e., Early Tasks, Conceptualization, and Implementation) contributed significantly in predicting one's potential involvement in research as a professional.

This study provides initial data on the usefulness of the Research Self-Efficacy Scale (Greeley, et al., 1989), which is designed to measure research self-efficacy. In recent years, Bandura's theory of self-efficacy has been broadly applied to areas such as counseling skills (i.e., see Johnson et al., 1989; Larson, Suzuki, Gillespie, Potenza, Bechtel, & Toulouse, 1990). Research self-efficacy may be effective in partially answering the question of why students lack strong interest in research-related activities and subsequently do little-to-no research following the attainment of their degrees.

This study has implications for training as well as further research studies. First, our data confirms the importance of examining and applying Bandura's (1977) notion of self-efficacy to the area of research training. Second, the results support what Gelso (1979) hypothesized; that is, early involvement in research activities is important for research training. Thus, it behooves training programs to provide early research training experiences to their students. Perhaps such experiences may be in the form of early involvement in a research practicum analogous to initial involvement in a counseling practicum (Wampold, 1986). Third, it was found that the number of years one has been in graduate school also contributed significantly to the prediction of research self-efficacy. It can be hypothesized that the longer one is in graduate school, the more likely she/he will be involved in research, and/or taken research-related courses. Thus, involvement in research-related activities seems to be the common denominator in the prediction of research self-efficacy.

Several limitations in the two studies must be noted. Some participants did not rate several research-related behaviors because the tasks were not applicable to their work. The present investigators substituted zeros for all missing confidence ratings under the assumption that the participants' ability to perform those behaviors was poor. This assumption may be incorrect; thus, clearer instructions are needed in order to have participants accurately rate each item. Another limitation is that only one question was posed regarding future research involvement: "Please rate the degree to which you are interested in doing research in your professional activities upon completion of your training." Thus, caution is recommended in interpreting the results. Further, it should be noted that the subscales described above predict <u>interest</u> in performing research as a professional, not actual involvement in research activities.

Future researchers need to continue to examine the psychometric properties of the RSES, particularly in a sample of psychology students. The results of this study found that 12% of the variance was accounted for in the prediction of research self-efficacy; other variables not tapped by the RSES appear to contribute significantly to research self-efficacy. It can be speculated that sources of self-efficacy expectations espoused by Bandura (1977), such as vicarious experiences, verbal persuasion, and emotional arousal may be involved. Moreover, the role of outcome expectations was not addressed in these studies but may play a critical role in one's decision to pursue involvement in research. Finally, these studies found that three of four of the subscales of the RSES contributed significantly to the prediction of one's potential involvement in research as a professional. Perhaps future researchers can use the RSES to sample professionals who are active in research to examine which subscales, if any, significantly contributed to their current involvement in research. A follow-up study could also compare students' ratings of their interest in doing research to their actual involvement in research as professionals.

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Table 1

Correlation Matrix of Predictor and Criterion Measures

	1	2	3	4	5	6	7	8	9	10	11	12
1	-											
2	.03	-										
3	-.22**	-.23**	-									
4	.04	.39**	-.14	-								
5	.01	.00	-.04	-.26**	-							
6	.01	.14	.06	.34**	-.20**	-						
7	-.09*	-.07	.06	-.12	-.03	-.09	-					
8	-.03	-.10	.13	.12	-.32**	.30**	-					
9	-.15*	-.00	-.26**	.12	-.04	.15*	.12	.53**	-			
10	-.01	.02	-.19**	.15*	-.25**	.05	.26**	.81**	.59**	-		
11	.07	-.15*	.37**	.04	-.27**	.41**	.24**	.89**	.27**	.50**	-	
12	.01	-.03	-.07	.21**	-.36**	.09	.29**	.78**	.45**	.74**	.53**	-

-

*p<.05 **p<.01

Note. 1=sex, 2=age, 3=doctoral program, 4=years in graduate program, 5=involvement in research, 6=research background, 7=research interest as a professional, 8=total RSES, 9=early tasks, 10=conceptualization, 11=implementation, 12=presentation.

Table 2

Hierarchical Regression Predicting Research Self-Efficacy

Variables	R^2	R^2 Change	F Change	Beta
Gender	.00	.00	.03	.01
Age	.00	.00	.01	.01
Yrs in grad school	.04	.04	5.39*	.22
Doctoral program	.05	.01	1.43	-.11
Research background	.07	02	2.46	.16
Research involvement	.12	.06	8.26**	.30

Note. n=136, * p<.05. **p<.01

Table 3

Hierarchical Regression Predicting Involvement in Research as a Professional

Variables	R^2	R^2 Change	F Change	Beta
Gender	.01	.01	1.19	-.14
Years in Graduate School	.03	.02	3.10	-.09
Doctoral program	.04	.01	1.91	.17
Research background	.05	.00	.38	-.01
Research involvement	.07	.02	2.58	-.07
Early Tasks	.12	.05	7.68**	4.91
Conceptualization	.19	.07	11.39**	1.39
Implementation	.23	.04	6.91**	6.79
Presentation	.24	.00	.52	7.63

Note. n=136, * p<.05. **p<.01